Panel 6: Integrated Modeling

The simulation codes currently used to design and analyze ignition experiments include HYDRA, LASNEX, Draco, Lilac, RAGE, FAST3D, Allegra, and CHIC. Physical processes modeled in the codes include radiation transport, electron and ion thermal transport, thermonuclear burn and transport of burn products. These codes include models for transport of laser light and the various processes which affect it. They also include magnetohydrodyanmics and the effects of magnetic fields on transport processes. Ingredients in the integrated models include atomic physics, in particular models for opacities and equations of state, both LTE and NLTE. Approaches that include kinetic, and non-fluid effects are being investigated.

We will discuss what developments would have the greatest impact on improving the state of the art in modeling ignition experiments, in part guided by existing data. Among the questions we will consider are the following. How can the computational power of future platforms be exploited? Which approximations made in the models significantly affect the accuracy of the simulations and how can these models be improved? Are there processes not treated in our models which significantly affect simulation results? Are there new approaches for modeling physical processes that would substantially benefit the simulation codes? Are there better ways to verify and validate the simulation codes?